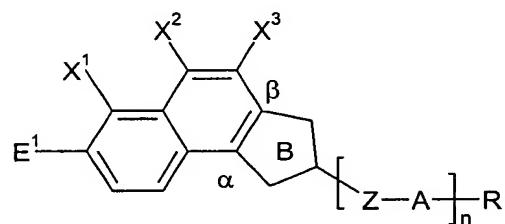


**Patent Claims**

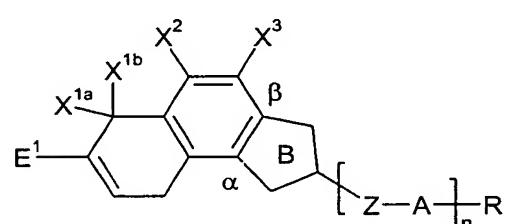
1. Cyclopenta[a]naphthalene derivative of the general formula I, II, III, IV or V

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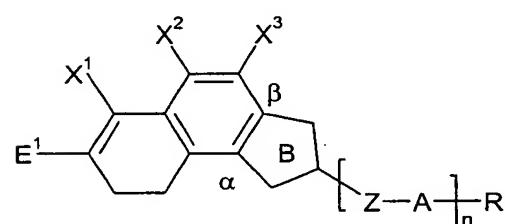
I

10



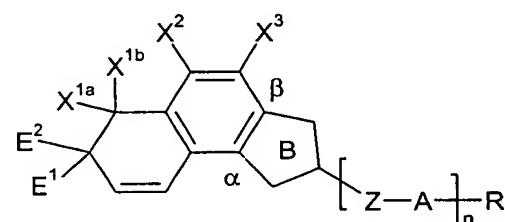
II

15



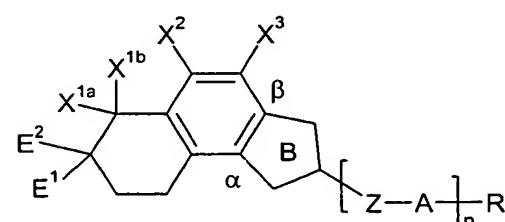
III

20



IV

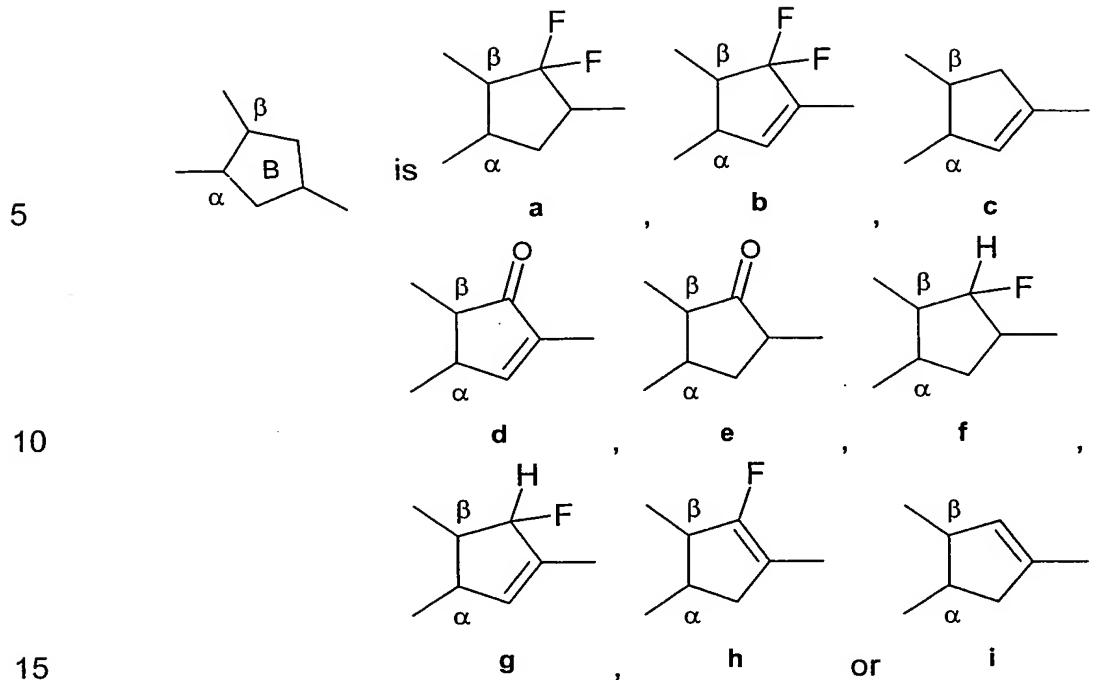
25



V

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in which:



A is in each case, independently of one another, 1,4-phenylene, in which  $=\text{CH}-$  may be replaced once or twice by  $=\text{N}-$ , and which may be monosubstituted to tetrasubstituted, independently of one another, by halogen (-F, -Cl, -Br, -I), -CN, -CH<sub>3</sub>, -CH<sub>2</sub>F, -CHF<sub>2</sub>, -CF<sub>3</sub>, -OCH<sub>3</sub>, -OCH<sub>2</sub>F, -OCHF<sub>2</sub> or -OCF<sub>3</sub>, 1,4-cyclohexylene, 1,4-cyclohexenylene or 1,4-cyclohexadienylene, in which -CH<sub>2</sub>- may in each case be replaced once or twice, independently of one another, by -O- or -S- in such a way that heteroatoms are not linked directly, and which all may be monosubstituted or polysubstituted by halogen;

Z is in each case, independently of one another, a single bond, a double bond, -CF<sub>2</sub>O-, -OCF<sub>2</sub>-, -CH<sub>2</sub>CH<sub>2</sub>-, -CF<sub>2</sub>CF<sub>2</sub>-, -CF<sub>2</sub>-CH<sub>2</sub>-, -CH<sub>2</sub>-CF<sub>2</sub>-, -CHF-CHF-, -C(O)O-, -OC(O)-, -CH<sub>2</sub>O-, -OCH<sub>2</sub>-, -CF=CH-, -CH=CF-, -CF=CF-, -CH=CH- or -C≡C-;

5                   R        is hydrogen, an alkyl, alkoxy, alkenyl or alkynyl radical having from 1 to 15 or 2 to 15 carbon atoms respectively which is unsubstituted, monosubstituted by -CN or -CF<sub>3</sub> or at least monosubstituted by halogen, where, in addition, one or more CH<sub>2</sub> groups in these radicals may each, independently of one another, be replaced by -O-, -S-, -CO-, -COO-, -OCO- or -OCO-O- in such a way that heteroatoms are not linked directly, halogen, -CN, -SCN, -NCS, -SF<sub>5</sub>, -CF<sub>3</sub>, -OCF<sub>3</sub>, -OCHF<sub>2</sub> or -OCH<sub>2</sub>F;

10                  X<sup>1</sup>, X<sup>1a</sup>, X<sup>1b</sup>, X<sup>2</sup> and X<sup>3</sup> are each, independently of one another, hydrogen, an alkyl, alkoxy, alkenyl or alkynyl radical having from 1 to 15 or 2 to 15 carbon atoms respectively which is unsubstituted or at least monosubstituted by halogen, where, in addition, one or more CH<sub>2</sub> groups in these radicals may each, independently of one another, be replaced by -O-, -S-, -CO-, -COO-, -OCO- or -OCO-O- in such a way that heteroatoms are not linked directly, halogen, -CN, -SF<sub>5</sub>, -SCN, -NCS, -CF<sub>3</sub>, -OCF<sub>3</sub>, -OCHF<sub>2</sub> or -OCH<sub>2</sub>F;

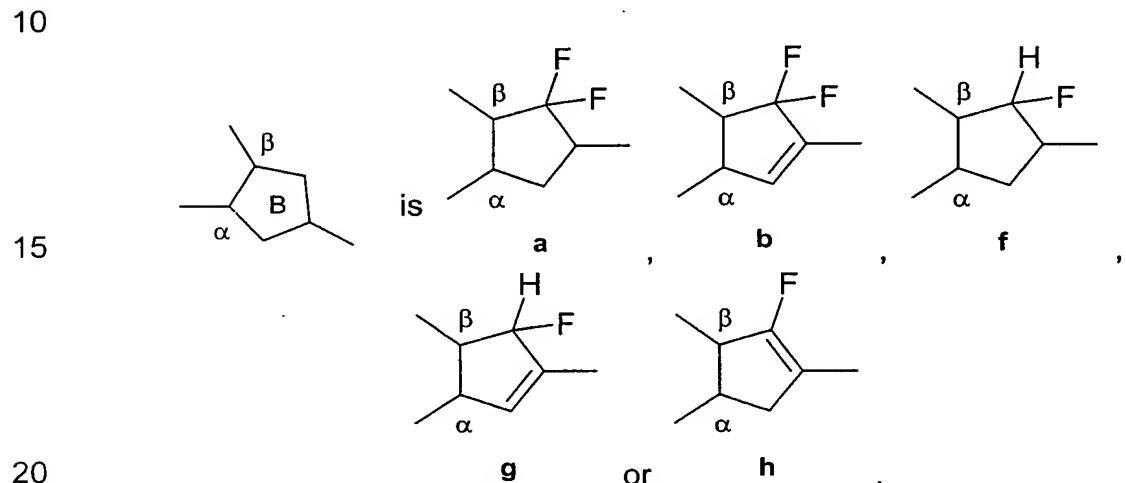
15                  E<sup>1</sup> and E<sup>2</sup> are each, independently of one another, hydrogen, an alkyl, alkoxy, alkenyl or alkynyl radical having from 1 to 15 or 2 to 15 carbon atoms respectively which is unsubstituted, monosubstituted by -CN or -CF<sub>3</sub> or at least monosubstituted by halogen, where, in addition, one or more CH<sub>2</sub> groups in these radicals may each, independently of one another, be replaced by -O-, -S-, -CO-, -COO-, -OCO- or -OCO-O- in such a way that heteroatoms are not linked directly, halogen, -CN, -SCN, -NCS, -SF<sub>5</sub>, -CF<sub>3</sub>, -OCF<sub>3</sub>, -OCHF<sub>2</sub>, -OCH<sub>2</sub>F or -(Z-A-)<sub>n</sub>-R; and

20                  n        is 0, 1, 2 or 3;

25                  35        where

5 in the formula I, ring B does not stand for the formula c if  $X^1$ ,  $X^2$  and  $X^3$  are simultaneously hydrogen, and  
in the formula I, ring B does not stand for the formula e if  $X^2$  and  $X^3$  are simultaneously fluorine or if  $E^1$  is hydrogen and simultaneously  $X^1$  and  $X^2$  are fluorine.

10 2. Cyclopenta[a]naphthalene derivative according to Claim 1, characterised in that

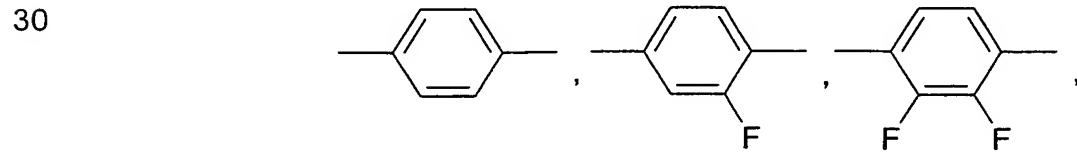


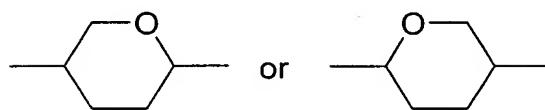
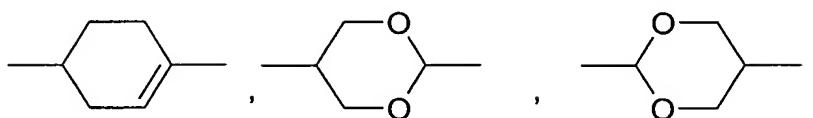
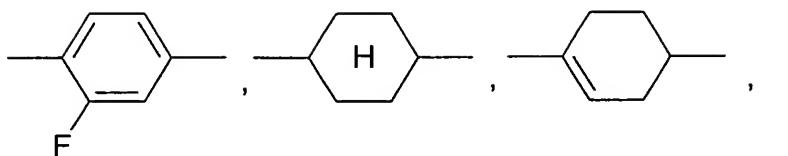
3. Cyclopenta[a]naphthalene derivative according to Claim 1 or 2, characterised in that

25  $Z$  is a single bond,  $-CF_2O-$ ,  $-OCF_2-$ ,  $-CF_2CF_2-$ ,  $-CH=CH-$ ,  $-CF=CH-$ ,  $-CH=CF-$  or  $-CF=CF-$ .

4. Cyclopenta[a]naphthalene derivative according to at least one of the preceding claims, characterised in that

A is





5. Cyclopenta[a]naphthalene derivative according to at least one of the preceding claims, characterised in that  
 15       R is an alkyl radical, alkoxy radical or alkenyl radical having from 1 to 7 or 2 to 7 carbon atoms respectively.

6. Cyclopenta[a]naphthalene derivative according to at least one of the preceding claims, characterised in that  
 20       E<sup>1</sup> and E<sup>2</sup>, independently of one another, are hydrogen, an alkyl radical or alkoxy radical having from 1 to 7 carbon atoms, fluorine, chlorine or  $(-Z-A-)_n-R$ , in which n is 1, Z is a single bond, A is 1,4-cyclohexylene or optionally mono- or poly-fluorine-substituted 1,4-phenylene, and R is alkyl, alkoxy or alkenyl having from 1 to 7 or 2 to 7 carbon atoms respectively.

25  
 7. Cyclopenta[a]naphthalene derivative according to at least one of the preceding claims, characterised in that  
 30       at least one of X<sup>1</sup>, X<sup>2</sup> and X<sup>3</sup> or at least one of X<sup>1a</sup>, X<sup>1b</sup>, X<sup>2</sup> and X<sup>3</sup> is -CF<sub>3</sub>, fluorine or chlorine.

8. Cyclopenta[a]naphthalene derivative according to at least one of the preceding claims, characterised in that  $X^1$ ,  $X^2$  and  $X^3$  or  $X^{1a}$ ,  $X^{1b}$ ,  $X^2$  and  $X^3$  are  $-CF_3$ , fluorine and/or chlorine.

5

9. Cyclopenta[a]naphthalene derivative according to at least one of the preceding claims, characterised in that  $X^1$ ,  $X^2$  and  $X^3$  or  $X^{1a}$ ,  $X^{1b}$ ,  $X^2$  and  $X^3$  are fluorine.

10

10. Use of a cyclopenta[a]naphthalene derivative according to at least one of the preceding claims in liquid-crystalline media.

11. Liquid-crystalline medium comprising at least two liquid-crystalline compounds, characterised in that it comprises at least one cyclopenta[a]naphthalene derivative according to at least one of Claims 1 to 9.

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12. Electro-optical display element containing a liquid-crystalline medium according to Claim 11.

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